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S&T and TSA Make Strides in Canine Explosives Detection

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Forty years ago, a jet headed to Los Angeles was recalled to New York when the airline received an anonymous tip about a bomb on the flight. When the aircraft returned, a dog named Brandy found the explosive device just 12 minutes before it was ready to detonate. The incident resulted in the creation of a federal project where any aircraft receiving a bomb threat could quickly divert to an airport with a canine team. While first responders have long used dogs to sniff out suspicious items in a wide variety of scenarios, the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) and the Transportation Security Administration (TSA) now aim to optimize canine explosives detection.

Canine performing an aircraft-bound cargo search. Photo courtesy of S&T.

The TSA National Explosives Detection Canine Team Program (NEDCTP) has approximately 700 canine teams in the field, with the majority of those teams under the jurisdiction of local law enforcement. TSA supports local law enforcement by funding the purchase and training of canines and the partial reimbursement of participating costs, such as care for the dogs. TSA also provides extensive dog handler training at Lackland Air Force Base in San Antonio, Texas. The training is a rigorous 10-week certification course that includes developing dog handler skills and learning about explosives handling, safety, and transportation requirements, explosives contamination issues, search techniques, and procedures for identifying dangerous materials. Once certified, local law enforcement teams provide a certain amount of their time screening TSA areas, such as mass transit, cargo facilities, or airports.

Odor recognition testing of explosives in cinder blocks, trace levels, non-explosive in cans. Photo courtesy of S&T.

DHS S&T supplements these explosive detection canine programs by providing tools, techniques, and knowledge to better understand, train, and use dogs in the field. S&T's canine program consists of three projects: Canine Training Aids, Canine Operational Environment Assessments, and Canine Structure and Function.

The Canine Training Aids project develops and tests training aids for the detection homemade explosives (HMEs). In 2010, S&T provided TSA NEDCTP with low-cost, nonhazardous canine training aids for evaluation. Field testing with operationally-deployed canine teams showed that the probability of detection using the training aid must be equal to or greater than the probability of detection using the explosive source. "The major accomplishment relative to the HMEs is the development of a design and manufacturing approach for a low-cost, non-hazardous training aids for the high priority threat HME's. The next set of training aids will be tested with explosives detection canine teams later this year," said Don Roberts, S&T program manager.

Canine Explosives Detection (continued)

Labrador puppies in the TSA breeding program. Photo courtesy of S&T.

S&T's Canine Operational Environment Assessments project enables TSA and other first responders to test and independently measure performance in operational settings where explosive detection canines may be used. "The operational evaluation brings a scientific rigor to canine testing in order to identify and better understand strengths and weaknesses in training and deployment strategies," said Roberts. S&T conducts testing for TSA and other DHS explosive detection canine users. To date, S&T has conducted testing for canine cargo screening assessments, facilitated search assessment training with ten teams, and participated in the TSA third-party pilot to evaluate the use of private source explosive detection canine teams to screen air cargo. S&T has also conducted assessments in three cities to determine the possible effects of an ozone device to mask the scent of explosives from canines, and tested various HME training aids.

S&T's Canine Structure and Function program is a research initiative aimed at increasing the number of high performing explosive detection dogs. S&T and TSA have partnered to perform a multi-year study to determine behavioral, physiological, and genetic identifiers of successful explosive detection dogs. Currently, the agencies are working with the University of Texas to determine behavioral indicators of high performing dogs and also with Dr. Liz Hare of Dog Genetics LLC to determine genetic markers of successful detection dogs.

In 2011, S&T in partnership with University of Texas developed a secure database of behavioral metrics to store and compare all program data for TSA puppies and dogs. They also identified clear signals of litter effects on behavior. Recent accomplishments in dog genetics include statistics on genetic merit for potential breeds and also recommendations for breeding pairs to maintain health and reproductive success. "Any gains we make in understanding behavioral indicators and genetic markers impact not just TSA, but any organization that uses canines. It's impacting the entire field because the research will benefit the first responder community at large. The same benefit applies with the training aids and information we get from operational assessments, as well," Roberts said.

For more information on DHS S&T's canine program, please send inquiries to sandt.explosives@dhs.gov. For more information on TSA NEDCTP, visit http://www.tsa.gov/lawenforcement/programs/editorial_1886.shtm.